

**Teacher Strikes as Public Signals: Impacts on Political Campaigns and Public Education
Funding**

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Online Appendix

Appendix A. Appendix Figures and Tables

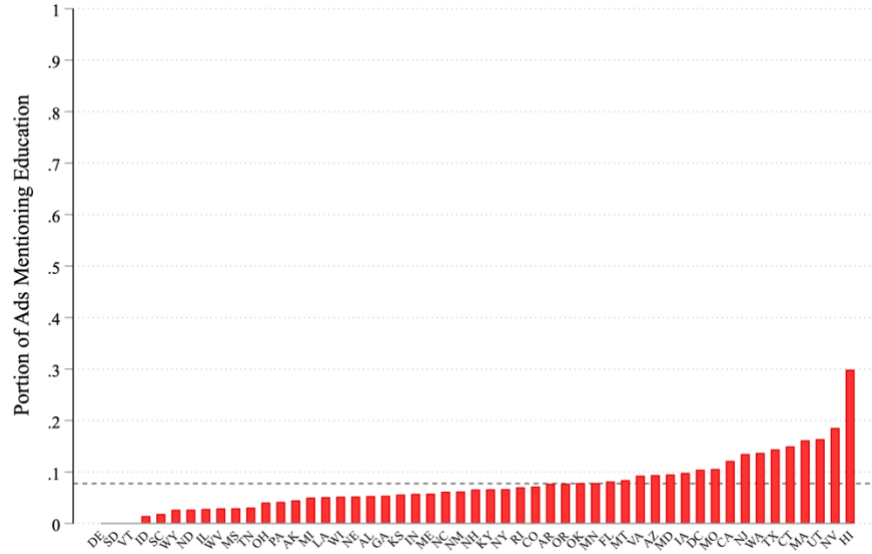
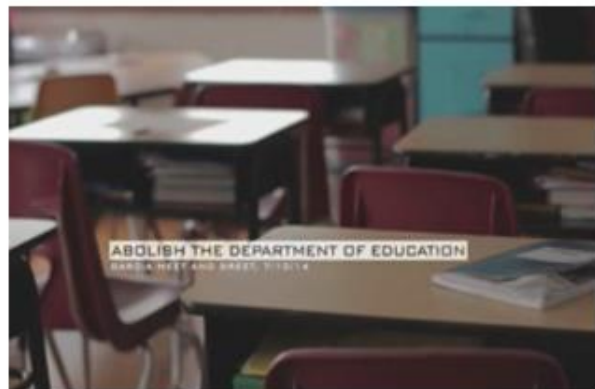


Figure A1. Portion of Education Ads by State, 2007-2018

Notes: Data are from Wisconsin and Wesleyan Media Projects and summarized at the advertisement level. Education ads are those that mention education.



Positive



Negative

Figure A2. Two Clips from Example Education Ads

Notes: Images are from political advertisements documented by the Wisconsin and Wesleyan Media Project. The left image shows a clip from an education ad promoting a congressional candidate running in the 10th district in the state of California. A teacher speaks in Spanish, arguing that (translated), “[The candidate] fights to empower teachers and get more money for education.” As she says this, upbeat music plays in the background. The second right picture shows an example of an ad attacking a congressional candidate in New Hampshire’s 2nd district. The ad is sponsored by a political party and features an anonymous voice declaring “[the candidate] would abolish the department of education,” with tense music playing.

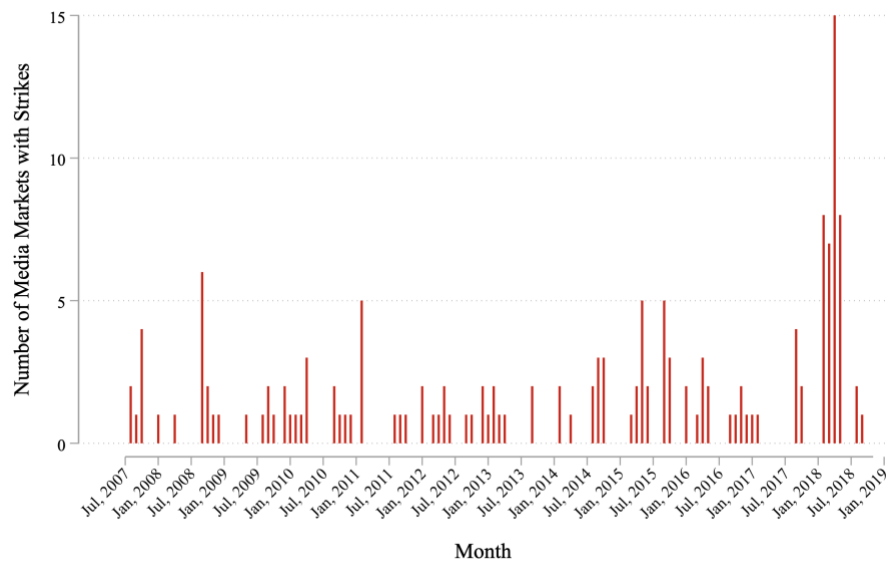


Figure A3. Number of Media Markets with Strikes over Time

Notes: Data are from the author’s compilation of strikes and the Wisconsin and Wesleyan Media Projects, merged at the media market-by-month-year level.

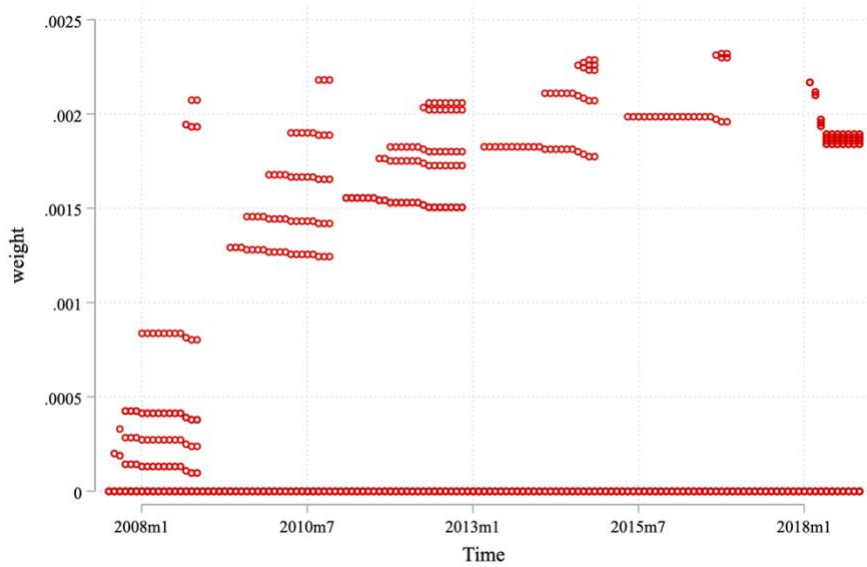


Figure A4. Weights for Each ATT within Media-Market-by-Month-Year Cells

Notes: Estimation process follows the recommendations of de Chaisemartin and D’Haultfoeuille (2020). Data are from the authors’ compilation, as well as the Wisconsin and Wesleyan Media Project.

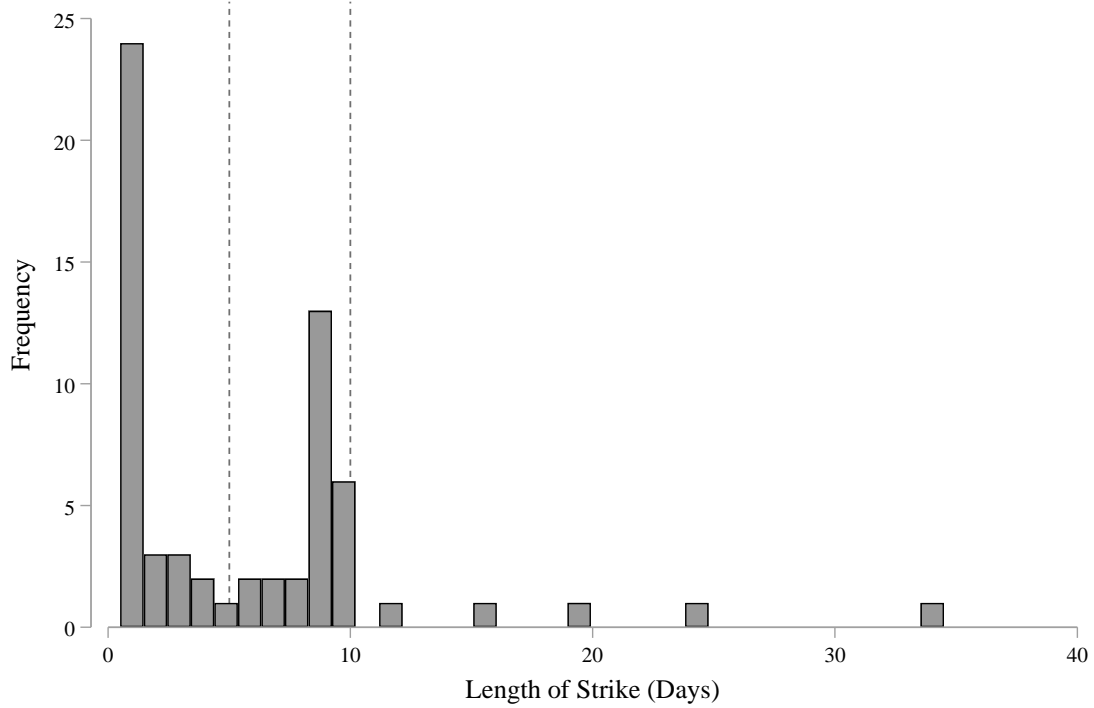


Figure A5. The Distribution of Strike Duration

Notes: Data are from the author’s compilation of strikes. Dotted lines indicate 5 and 10 days to display the three bins used to examine heterogeneous effects depending on the length of strikes.

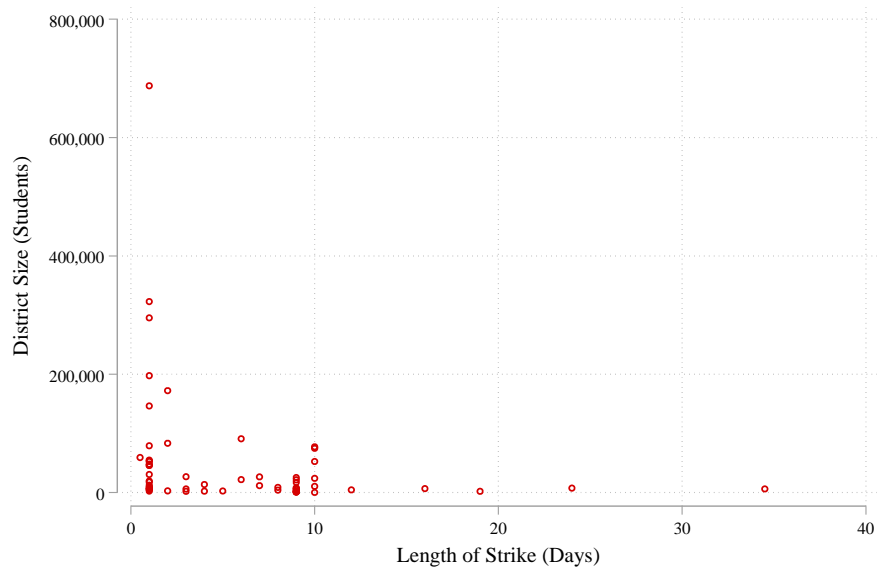


Figure A6. The Distribution of Strike Duration and District Size

Notes: Data are from the author’s compilation of strikes. There is a small, negative correlation between district size and strike length ($r=-0.263$, $p<.05$).

Table A1. Characteristics of Election Ads Mentioning Education v. Non-Education Ads (U.S. House of Representatives 2007-2018)

	Education Ads	Non-Education Ads
Length of Ad (Seconds)	30.5	30.0
Estimated Cost of Ad (2018\$)	\$573.49	\$557.92
Timing		
Early	47.9%	48.5%
Daytime	20.4%	19.7%
Primetime	15.2%	15.4%
Late	16.5%	16.4%
Favored Party		
Democrat	78.9%	51.6%
Republican	21.0%	47.9%
Third Party/Other	0.1%	0.5%
Sponsor		
Candidate	73.9%	63.4%
Political Party	10.7%	16.2%
Candidate and Party	3.86%	4.00%
Interest Group	11.6%	16.4%
Tone		
Positive: Promote a Candidate	63.0%	39.1%
Negative: Attack a Candidate	27.7%	45.0%
Observations	355,086	4,227,440

Notes: Data are from Wisconsin and Wesleyan Media Project and summarized at the advertisement level. Education ads are those that mention education. Non-education ads do not mention education.

Table A2.

Sensitivity Analyses for the Effects of Strikes on the Probability of Airing Education Ads

	Baseline Mean	All Strikes		First Strike Only, Treated Election Cycles Modeled Separately		First Strike Only, Treated Entire Panel After Treatment (Standard TWFE)	
		(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Education Ads							
Effect of Strikes, Full Election Cycle	0.047	0.049** (0.019)		0.053* (0.021)		0.038** (0.014)	
Effect of Strikes, Peak Ad Period	0.236		0.083* (0.043)		0.123* (0.049)		0.123* (0.049)
Effect of Strikes, Not Peak Ad Period	0.019		0.035* (0.014)		0.024 (0.016)		0.026* (0.012)
Panel B: Positive Education Ads							
Effect of Strikes, Full Election Cycle	0.039	0.046* (0.019)		0.047* (0.020)		0.035** (0.013)	
Effect of Strikes, Peak Ad Period	0.181		0.073+ (0.041)		0.103* (0.045)		0.103* (0.046)
Effect of Strikes, Not Peak Ad Period	0.018		0.035** (0.014)		0.024 (0.015)		0.025* (0.011)
Panel C: Negative Education Ads							
Effect of Strikes, Full Election Cycle	0.013	-0.005 (0.007)		0.002 (0.009)		0.001 (0.006)	
Effect of Strikes, Peak Ad Period	0.084		-0.019 (0.021)		0.005 (0.029)		0.005 (0.029)
Effect of Strikes, Not Peak Ad Period	0.002		0.001 (0.003)		0.000 (0.003)		-0.000 (0.005)
Observations		34,639	34,639	28,633	28,633	28,633	28,633
Media Market Fixed Effects				X	X	X	X
Month-Year Fixed Effects		X	X	X	X	X	X
Media Market* Event Fixed Effects		X	X				

Notes: * $p < 0.05$, ** $p < 0.01$. Robust standard errors clustered at the media market level are in parentheses. The peak ad period includes the September-November leading up to an election. In the All Strikes model, we create a copy of each media market experiencing multiple events, estimate the effect of each strike separately, and then add weights to correct for overrepresentation of media markets with multiple weights, following the procedure outlined by Lafortune and colleagues (2018).

Table A3.

Media Market Characteristics by Strike Length

	Strikes Lasting 5 Days or Less	Strikes Lasting 6-10 Days	11+ Day Strikes
% Unemployed	6.0	6.3	5.7
Median Household Income (2019\$)	28,929	26,521	25,765
% White	77.2	79.9	84.1
% Non-Hispanic White	63.2	63.9	74.0
% Hispanic	14.9	19.4	5.0
% Black	10.7	7.9	10.4
% Native American	1.1	1.3	0.2
% Asian or Pacific Islander	4.5	3.3	2.0
% Other Race	9.4	11.1	5.6
% Parents	19.9	20.4	19.9
% School Age Children	2.3	2.5	2.2
Democratic Vote Share	46.8	45.4	52.2
Republican Vote Share	51.4	53.3	45.8
Other Vote Share	1.9	1.4	2.2
Striking District Size (Students)	76,552	20,094	5,432
Number of Strikes	33	25	5

Notes: Data describe the media market characteristics at the time of the first strike in a given media market

Table A4.

Variation in the Effect of Strikes on the Probability of Airing Education Ads by Strike Intensity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All Education Ads			Positive Education Ads			Negative Education Ads		
Effect of Smaller District Strikes	0.032			0.035			0.003		
	(0.031)			(0.028)			(0.016)		
Effect of Larger District Strikes	0.096**			0.074*			0.008		
	(0.034)			(0.033)			(0.014)		
Effect of Strikes: Low Percent Affected		0.073			0.050			0.019	
		(0.047)			(0.039)			(0.029)	
Effect of Strikes: Mid Percent Affected		0.098*			0.087*			0.001	
		(0.042)			(0.040)			(0.014)	
Effect of Strikes: High Percent Affected		0.035			0.034			-0.000	
		(0.034)			(0.033)			(0.012)	
Effect of Strikes: Low Student Concentration			0.034			0.049			-0.005
			(0.045)			(0.045)			(0.014)
Effect of Strikes: Mid Student Concentration			0.072*			0.045			0.001
			(0.035)			(0.030)			(0.017)
Effect of Strikes: High Student Concentration			0.082+			0.071+			0.018
			(0.042)			(0.040)			(0.020)
<i>P-value from F-test of Equivalence</i>	<i>0.167</i>	<i>0.476</i>	<i>0.711</i>	<i>0.354</i>	<i>0.583</i>	<i>0.869</i>	<i>0.793</i>	<i>0.819</i>	<i>0.626</i>
Observations	25,873	25,873	25,873	25,873	25,873	25,873	25,873	25,873	25,873
Media Market Fixed Effects	X	X	X	X	X	X	X	X	X
Month-Year Fixed Effects	X	X	X	X	X	X	X	X	X

Notes: + $p < 0.10$, * $p < 0.05$. Models include no control variables. Robust standard errors clustered at the media market level are in parentheses. Percent Affected is defined as the percent of students in media market that were in a striking district and trichotomized. Student Concentration is defined as the percent of the media market population comprised of students and trichotomized. The percent of students affected is negatively correlated with the percent of school age children in the market variable. This is because there are a good deal of small strikes in places with lots of school age children. A small strike in a place with lots of school age children will be low on the percent of school age kids affected variable and high on the percent of the population that is comprised of students.

Table A5.
The Effect of Strikes on the Probability of Incumbents Airing Education Ads

	Baseline Mean	(1)	(2)
Panel A: Education Ads			
Effect of Strikes, Full Election Cycle	0.022	0.034+ (0.019)	
Effect of Strikes, Peak Ad Period	0.126		0.074+ (0.043)
Effect of Strikes, Not Peak Ad Period	0.007		0.016 (0.013)
<i>P-value from F-test of Equivalence</i>			0.135
Panel B: Positive Education Ads			
Effect of Strikes, Full Election Cycle	0.017	0.021 (0.016)	
Effect of Strikes, Peak Ad Period	0.086		0.034 (0.035)
Effect of Strikes, Not Peak Ad Period	0.007		0.015 (0.013)
<i>P-value from F-test of Equivalence</i>			0.555
Panel C: Negative Education Ads			
Effect of Strikes, Full Election Cycle	0.006	0.010 (0.011)	
Effect of Strikes, Peak Ad Period	0.047		0.028 (0.030)
Effect of Strikes, Not Peak Ad Period	0.000		0.002 (0.003)
<i>P-value from F-test of Equivalence</i>			0.992
Observations		25,873	25,873
Media Market Fixed Effects		X	X
Month-Year Fixed Effects		X	X

Notes: * $p < 0.05$, ** $p < 0.01$. Incumbent lists, as well as their state, election year, Congressional District, and party identifiers were culled from the biennial Federal Election Commission published Federal Elections Results. We then identify whether education ads in support of incumbents are aired using these identifiers. Baseline mean is defined as the mean probability of airing an education ad in untreated markets. Columns 1 and 2 show results from an adapted TWFE model that censors observations from treated markets after the first election cycle after the first strike (Equations 3 and 4). Models include no control variables. Robust standard errors clustered at the media market level are in parentheses. The peak ad period includes the September-November leading up to an election. Positive ads are promotional towards a candidate, whereas negative ads are those that attack a candidate.

Table A6.

The Effect of Strikes on the Total Cost of Education Ads (2018\$)

	(1)	(2)	(3)	(4)	(5)	(6)
	Education Ad Spending (IHS-transformed)		Extensive Margin		Intensive Margin	
Effect of Strikes, Full Election Cycle	1.263*		0.054*		0.159	
	(0.589)		(0.027)		(0.363)	
Effect of Strikes, Peak Ad Period		2.512*		0.110*		-0.069
		(1.137)		(0.051)		(0.373)
Effect of Strikes, Not Peak Ad Period		0.661+		0.028		0.676
		(0.399)		(0.019)		(0.542)
<i>P-value from F-test of Equivalence</i>		<i>0.045</i>		<i>0.051</i>		<i>0.128</i>
Observations	21,126	21,126	21,126	21,126	847	847
Media Market Fixed Effects	X	X	X	X	X	X
Month-Year Fixed Effects	X	X	X	X	X	X

Notes: + $p < .10$, * $p < 0.05$. Models include no control variables. Robust standard errors clustered at the media market level are in parentheses. The peak ad period includes the September–November leading up to an election. Because cost information is missing for the 2010 elections, data from the 2010 election cycle are excluded. We estimate the extensive margin by examining the effect of teacher strikes on whether political actors spent any money on education ads with a binary outcome coded 1 if political actors spent any money on education ads. We estimate the intensive margin as the effect of strikes on education ad spending, conditional on spending any money on education ads. Because the education ad spending variable was very skewed, we log transformed it.

Table A7.

The Effect of Strikes on Education Spending, 2016\$

	Current Expenditures per Pupil		Total Revenues per Pupil		Local Revenues per Pupil		State Revenues per Pupil		Federal Revenues per Pupil	
Effect of Strikes	463.1**		521.1***		-171.6*		583.4***		46.3*	
	(174.9)		(140.6)		(74.5)		(136.4)		(19.7)	
Effect of Strikes Lasting 5 Days or Less	548.5**		581.9***		-185.9**		677.4***		53.8*	
	(169.2)		(140.0)		(71.3)		(126.0)		(21.1)	
Effect of Strikes Lasting 6-10 Days	-298.0		-6.6		-363.0		70.5		-24.9	
	(649.7)		(561.5)		(296.5)		(492.1)		(73.4)	
Effect of 11+ Day Strikes	840.8**		774.4***		112.4		645.3**		78.9*	
	(262.9)		(219.1)		(171.4)		(231.3)		(31.9)	
<i>P-value from F-test of Equivalence</i>	<i>0.387</i>		<i>0.204</i>		<i>0.192</i>		<i>0.466</i>		<i>0.409</i>	
Observations	167,945	167,945	167,958	167,958	166,470	166,470	167,087	167,087	166,074	166,074
District Fixed Effects	X	X	X	X	X	X	X	X	X	X
School Year Fixed Effects	X	X	X	X	X	X	X	X	X	X

Notes: * p<0.05, ** p<0.01, *** p<0.001. Models control for district student enrollment. Robust standard errors clustered at the school district level are in parentheses. Outcome data are unavailable for strikes during the 2017-18 and 2018-19 school years; districts in strikes in these years are dropped from the sample.

Table A8.

Additional Sensitivity Checks for the Effect of Teachers Strikes on the Probability of Airing Education Ads

	Baseline Mean	Stacked by Cohort		Regional Time Trends		Region*Month-Year Fixed Effects		State Fixed Effects		Drop Spillover Markets	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Education Ads											
Effect of Strikes, Full Election Cycle	0.047	0.066** (0.023)		0.066** (0.024)		0.044* (0.019)		0.045* (0.019)		0.066** (0.025)	
Effect of Strikes, Peak Ad Period	0.236		0.139** (0.049)		0.139** (0.051)		0.084* (0.041)		0.090* (0.043)		0.145** (0.052)
Effect of Strikes, Not Peak Ad Period	0.019		0.032+ (0.018)		0.033+ (0.018)		0.025 (0.017)		0.024 (0.016)		0.030 (0.019)
Panel B: Positive Education Ads											
Effect of Strikes, Full Election Cycle	0.039	0.056** (0.022)		0.056* (0.022)		0.037+ (0.019)		0.040* (0.018)		0.056* (0.023)	
Effect of Strikes, Peak Ad Period	0.181		0.115* (0.046)		0.114* (0.048)		0.068+ (0.041)		0.077+ (0.042)		0.120* (0.049)
Effect of Strikes, Not Peak Ad Period	0.018		0.029+ (0.017)		0.030+ (0.017)		0.023 (0.017)		0.023 (0.016)		0.027 (0.018)
Panel C: Negative Education Ads											
Effect of Strikes, Full Election Cycle	0.013	0.004 (0.010)		0.006 (0.011)		-0.008 (0.011)		-0.005 (0.012)		0.005 (0.011)	
Effect of Strikes, Peak Ad Period	0.084		0.004 (0.027)		0.006 (0.030)		-0.027 (0.030)		-0.019 (0.030)		0.008 (0.031)
Effect of Strikes, Not Peak Ad Period	0.002		0.004 (0.004)		0.006 (0.004)		-0.000 (0.005)		0.001 (0.005)		0.004 (0.004)
Observations		565,927	565,927	25,873	25,873	25,873	25,873	25,873	25,873	24,243	24,243
Media Market Fixed Effects				X	X	X	X	X	X	X	X
Month-Year Fixed Effects		X	X	X	X			X	X	X	X
Media Market* Cohort Fixed Effects		X	X								
Region*Month-Year Fixed Effects						X	X				
State Fixed Effects								X	X		

Notes: +p<.10, * p<0.05, ** p<0.01. Robust standard errors clustered at the media market level are in parentheses. The peak ad period includes the September-November leading up to an election.

Table A9.

The Effect of Strikes on Contributions from Teachers' Unions

	Baseline Mean	Total Contributions from Teachers' Unions, 2018\$	Total Contributions from Teachers' Unions, IHS- Transformed
Effect of Strikes	\$7,844	\$-838.71 (1048.23)	-0.002 (0.831)
Observations		1,951	1,951
Congressional District Fixed Effects		X	X
Election Year Fixed Effects		X	X

Notes: Effect of strikes estimate is from an adapted TWFE model that censors observations from treated markets after the first election cycle after the first strike (Equation 3), using congressional district and election year fixed effects instead of media market and month-year fixed effects respectively. The first model estimates the effect of strikes on campaign contributions from teachers' unions in real 2018 dollars, and the second model uses a version of this outcome that is inverse-hyperbolic-sine-transformed (IHS-transformed) due to the large number of congressional-district-by-election-year observations in which teachers' unions contribute \$0. Because contribution data is missing for the 2008 elections, data from the 2008 election cycle are excluded. Models include no control variables. Robust standard errors clustered at the congressional district level are in parentheses.

Table A10.

The Effects of Strikes on the Probability of Airing Education Ads with Media-Market-by-Month Control Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>All Ads</i>								
Effect of Strikes, Full Election Cycle	0.045*		0.054**		0.061**		0.050*	
	(0.019)		(0.020)		(0.022)		(0.023)	
Effect of Strikes, Peak Ad Period		0.090*		0.106*		0.136**		0.082+
		(0.043)		(0.043)		(0.050)		(0.047)
Effect of Strikes, Not Peak Ad Period		0.024		0.024		0.028+		0.035+
		(0.016)		(0.016)		(0.017)		(0.018)
<i>Positive Ads</i>								
Effect of Strikes, Full Election Cycle	0.040*		0.045*		0.051*		0.044*	
	(0.018)		(0.019)		(0.021)		(0.022)	
Effect of Strikes, Peak Ad Period		0.077+		0.087*		0.111*		0.069
		(0.042)		(0.041)		(0.047)		(0.046)
Effect of Strikes, Not Peak Ad Period		0.023		0.021		0.024		0.032+
		(0.016)		(0.015)		(0.016)		(0.017)
<i>Negative Ads</i>								
Effect of Strikes, Full Election Cycle	-0.005		0.002		0.006		0.001	
	(0.012)		(0.011)		(0.011)		(0.012)	
Effect of Strikes, Peak Ad Period		-0.019		-0.004		0.006		-0.016
		(0.030)		(0.031)		(0.030)		(0.031)
Effect of Strikes, Not Peak Ad Period		0.001		0.004		0.006		0.009+
		(0.005)		(0.004)		(0.004)		(0.005)
Observations	25,873	25,873	25,873	25,873	25,873	25,873	21,126	21,126
<i>Controls</i>								
Number of Ads	X	X						
Other Types of Ads			X	X				
Tone of all Ads in a Month					X	X		
Total Ad Spending							X	X

Notes: + p<.10, * p<0.05, ** p<0.01. Robust standard errors clustered at the media market level are in parentheses. The peak ad period includes the September-November leading up to an election. All analyses include media market fixed effects and month-year fixed effects. Other types of ads include the same set of ads in Table 5 (veterans, farm, energy, and Middle East policy).

Table A11.

The Effects of Strikes on the Probability of Airing Education Ads with Media-Market-by-Year Control Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>All Ads</i>										
Effect of Strikes, Full Election Cycle	0.071** (0.025)		0.063** (0.023)		0.065** (0.024)		0.067** (0.024)		0.068** (0.024)	
Effect of Strikes, Peak Ad Period		0.140** (0.052)		0.131* (0.051)		0.135** (0.051)		0.139** (0.051)		0.135* (0.052)
Effect of Strikes, Not Peak Ad Period		0.039* (0.019)		0.032+ (0.017)		0.034+ (0.018)		0.035+ (0.018)		0.038* (0.018)
<i>Positive Ads</i>										
Effect of Strikes, Full Election Cycle	0.060** (0.023)		0.053* (0.022)		0.056* (0.022)		0.058* (0.022)		0.057* (0.023)	
Effect of Strikes, Peak Ad Period		0.115* (0.049)		0.108* (0.049)		0.112* (0.048)		0.116* (0.049)		0.110* (0.050)
Effect of Strikes, Not Peak Ad Period		0.035+ (0.018)		0.029+ (0.017)		0.030+ (0.017)		0.032+ (0.018)		0.033+ (0.017)
<i>Negative Ads</i>										
Effect of Strikes, Full Election Cycle	0.005 (0.011)		0.005 (0.011)		0.005 (0.011)		0.005 (0.011)		0.005 (0.011)	
Effect of Strikes, Peak Ad Period		0.004 (0.031)		0.003 (0.030)		0.004 (0.030)		0.003 (0.031)		0.003 (0.031)
Effect of Strikes, Not Peak Ad Period		0.006 (0.004)		0.006 (0.004)		0.006 (0.004)		0.006 (0.004)		0.006 (0.004)
Observations	23,857	23,857	24,604	24,604	24,621	24,621	24,497	24,497	23,703	23,703
<i>Controls</i>										
Racial Demographics	X	X							X	X
Economic Characteristics			X	X					X	X
Percent Parents					X	X			X	X
Percent School Age							X	X	X	X

Notes: + $p < .10$, * $p < 0.05$, ** $p < 0.01$. Robust standard errors clustered at the media market level are in parentheses. The peak ad period includes the September-November leading up to an election. All analyses include media market fixed effects and month-year fixed effects. Controls are aggregated from county-year level Census and Bureau of Labor Statistics data to generate population-weighted, media-market-by-year-level estimates. Racial demographics include the percent of the population that is White and the percent that is Black, with other races as the uncoded comparison group. Economic characteristics include the median family income, the percent unemployed, and the estimated GDP.

Table A12.
Robustness Checks for the Effects of Strikes on Education Spending

	(1)	(2)	(3)	(4)
	C&S Estimates (Main Model)	Traditional Event Study	Socio-demographic Controls	Drop Spillover Districts
Panel A. Total Current Expenditures per Pupil 2016 \$				
Years Pre/Post Strike				
-3	84 (91)	-173 (113)	124 (106)	109 (128)
-2	41 (69)	-203 (116)	5 (85)	20 (93)
-1	177 (92)	- (-)	156 (129)	295** (102)
0	-43 (59)	-90 (79)	-109 (73)	20 (70)
1	375*** (92)	282** (109)	311** (113)	485*** (114)
2	485*** (130)	389** (145)	409** (130)	636*** (133)
3	670*** (151)	612** (194)	500*** (150)	840*** (155)
4	423 (329)	244 (305)	292 (297)	603 (331)
Panel B. Total Revenues per Pupil 2016 \$				
-3	-200 (216)	-225 (150)	-216 (236)	-243 (254)
-2	143 (96)	-197 (149)	90 (112)	103 (124)
-1	104 (119)	- (-)	63 (175)	295* (115)
0	101 (92)	51 (104)	35 (118)	135 (110)
1	408*** (98)	320* (130)	298* (132)	491*** (123)
2	661*** (119)	508*** (139)	525*** (148)	858*** (123)
3	777*** (133)	664*** (192)	559*** (154)	971*** (143)
4	762** (266)	340 (285)	600* (274)	974*** (289)
Observations	167,421	167,876	167,421	105,076
District Fixed Effects	X	X	X	X
School Year Fixed Effects	X	X	X	X

Notes: * p<0.05, ** p<0.01, *** p<0.001. Robust standard errors clustered at the district level are in parentheses. Models include controls for district enrollment. Sociodemographic controls include the percent of school-age children in poverty, the percent of special education students, and the percent of English Language Learners.

Table A13.
Placebo Falsification Tests for the Effect of Strikes by Partisanship and Competitiveness

	Veterans Ads		Farm Ads		Energy Ads		Middle East Foreign Policy Ads	
Effect of Strikes	0.035		0.018		0.012		0.022	
	(0.022)		(0.018)		(0.017)		(0.017)	
Effect of Strikes, Battleground Areas	0.112***		-0.001		-0.027		0.069	
	(0.029)		(0.034)		(0.019)		(0.052)	
Effect of Strikes, Republican-Dominant Areas	-0.024		0.023		0.031		-0.012	
	(0.025)		(0.029)		(0.032)		(0.023)	
Effect of Strikes, Democratic-Dominant Areas	0.047		0.021		0.011		0.029	
	(0.034)		(0.027)		(0.025)		(0.024)	
<i>P-value from F-test of Equivalence:</i>								
<i>Battleground-Republican</i>	0.000		0.588		0.110		0.149	
<i>Battleground-Democratic</i>	0.145		0.615		0.227		0.483	
Baseline Mean	0.055	0.055	0.022	0.022	0.046	0.046	0.030	0.030
Observations	21,900	21,900	21,900	21,900	21,900	21,900	21,900	21,900
Media Market Fixed Effects	X	X	X	X	X	X	X	X
Month-Year Fixed Effects	X	X	X	X	X	X	X	X

Notes: *** p<0.001. Baseline mean is defined as the mean probability of airing an ad of a given issue in untreated markets. Models include no control variables. Robust standard errors clustered at the media market level are in parentheses. Battleground Areas are markets in which the average baseline Republican or Democratic vote share is between 48 and 52 percent. Republican- and Democratic-Dominant Areas are those in which the average baseline vote share is over 52% for Republican and Democratic candidates respectively.

Appendix B. Notes on Data Collection and Management

Collecting Strike Data—We conducted 144 separate Google searches for each month between 7/1/2007 to 7/1/2019 using the keyword “strike” with the “News” filter and the “Tools” feature to customize the time ranges. We also conducted 50 separate ProQuest searches for each state using “News Documents” between 7/1/2007 and 7/1/2019 with the search term “teacher strike” and the state name (e.g., “‘teacher strike’ AND Pennsylvania”). Additionally, we systematically reviewed NEA and AFT national websites and state affiliate websites to search for evidence of strikes, which were documented primarily in their featured articles, news mentions, and social media accounts. We combined this original data collection effort with two pre-existing data sources: (1) a dataset created by a team of journalists at Mother Jones that had also undergone a previous effort of tracking teacher strikes; (2) the U.S. Bureau of Labor Statistics documentation of work stoppages involving more than 1,000 workers. We validated the resulting database using administrative data on the universe of strikes in Pennsylvania provided to us by the PA Department of Education (DOE). Specifically, we compared the PA strikes we uncovered with the PA DOE data, which suggested that we found 85% of all strikes in that state.

Combining Strike Data with Election Ads—To analyze teacher strikes and election ads together, we construct a media-market-by-month-year panel (n=25,873). To do this we aggregate both the Wisconsin and Wesleyan Media Project election ad-level data and our original district strike-level data to the media-market-by-month-year level. Election ads air at the media market level making this aggregation process straightforward. The processes of collapsing the strike data to the media-market level was more complicated because a crosswalk connecting school districts to media markets does not exist. We approached this aggregation process by first aggregating our district-level, strike data to the county level. We then coded each county based on whether a

school district in that county had experienced a strike using School District Geographic Relationship Files from the NCES. This allowed us to use the county-to-media market crosswalk produced by The Nielsen Company to connect the strike data to the election ad data at the media market level.

Though there are many more school districts than counties, some school districts contain multiple counties. This is potentially problematic because an individual district strike should only be counted once. Therefore, if a striking school district contained multiple counties, we took special note of the district and counties. We then attached school district information to any counties within that district. Next, we used a crosswalk to collapse counties to the media market level. At this level, no duplicates of individual district strikes remained, suggesting that any school districts encompassing multiple counties were contained within a single media market.

One factor complicating this process is that media markets change their numerical designations and their boundaries over time. In a given year there are 210 media markets, but their identifiers can shift across years. Fortunately, all of the media markets in which strikes took place were unchanged during the time period of our panel. However, this did complicate the merging process, and so we used the location-based names of the media markets to define them over time instead of their numerical identifiers in the Wisconsin and Wesleyan Media Project data.

Missing Ad-Level Data—At the election ad level there was a very small amount of missing data on indicators of interest. Information about education mentions was missing on 1.23% of election ads. For tone (promotional versus attack), 1.43% of ads were missing. We drop these missing ads in the process of aggregating to the media-market-by-month-year level.

Combining Partisan Vote Share Data—To merge partisan vote share data to our media-market-by-month dataset, we began with the candidate-by-election-year-level Klarner State Legislative Election Returns (SLERs) database of votes for candidates for state legislatures. We first aggregated these individual candidate-by-year-level data into a county-by-year level panel to generate indicators of the mean vote share for Republican, Democratic, and third-party candidates for state legislative office. We then merged media market identifiers into the county-year-level vote share data. Finally, we collapsed to the media market-year level with county-year-population weighted averages. This allows us to generate an indicator of the general partisan leaning of the area but does not precisely tell us the competitiveness of the congressional elections within a given media market. Because there are more congressional districts than media markets, and they do not perfectly overlap, it is possible that some media markets with multiple congressional districts could have multiple non-competitive elections within a given area but appear to be an area with competitive elections. However, we investigated this using the most recent data (2018) and found that the plurality of media markets (40%) contained only one congressional district for which there were election ads.

Missing Data on Partisan Vote Share—Of the media markets in our sample, 23 (11%) had no counties with information on partisan vote share in 2006. These media markets are listed below and removed from all analyses of partisan vote share. Media markets with both missing vote share data and strikes are shaded in grey.

Anchorage	Little Rock
Bakersfield	Los Angeles
Birmingham	Monterey
Chico	Montgomery
Colorado Springs	Phoenix
Eureka	Sacramento
Fairbanks	San Diego
Fresno	San Francisco

Grand Junction
Hartford
Jonesboro
Juneau

Santa Barbara
Tucson
Yuma

Appendix C. Strike Type

We examine whether findings are driven by coordinated strikes across districts within states, such as the prominent, large-scale strikes in 2018. Though these 2018 coordinated strikes did not uniformly achieve the policy changes that teachers demanded, the public generally received them positively (Hertel-Fernandez, Naidu, and Reich 2020). Additionally, a substantial portion of the first strikes that we observe were strikes coordinated across districts. Of the 63 media markets with at least one strike, 33 experienced coordinated strikes as their first strike in our panel. We observe coordinated strikes in 2012, 2015, and 2018.

We explore this question by fitting additional models where we estimate effects separately for individual and coordinated strikes. Similar to our analysis of strike length, we replace the single treatment term from Equation 3 with two separate treatment terms for individual (single district) and coordinated (multiple districts within a state) teacher strikes and report coefficients for these two treatment terms in Table C1. Results suggest that individual strikes increase the probability of airing an education ad by roughly eight percentage points, and coordinated strikes increase the probability of airing education ads by a slightly smaller amount (5.6 percentage points). These estimates are not statistically different.

We also examine whether the effects of teacher strikes on education finance vary between individual and coordinated strikes. In Table C2, we show the results of a parallel specification in our school-district-by-school-year panel dataset. We find no evidence of heterogeneity in the effects of teacher strikes on per pupil expenditures, revenues, local revenues, state revenues, or federal revenues. Findings for state revenues are of particular importance because the coordinated strikes across districts targeted states directly, whereas individual district strikes targeted local districts. Despite this, we find no evidence that individual and coordinated

strikes had different effects on state revenues. Taken together, these results emphasize the importance of the signals that teacher strikes provide to state policymakers—about both the need for an increased emphasis on education and increased funding for education—rather than the direct effect of strikes on localized collective bargaining negotiations.

Table C1.

The Effect of Individual v. Coordinated Strikes on the Probability of Airing Education Ads

	Education Ads	Positive Education Ads	Negative Education Ads
Effect of Individual Strikes	0.084+ (0.043)	0.055 (0.037)	0.021 (0.027)
Effect of Coordinated Strikes	0.056* (0.027)	0.056* (0.027)	-0.003 (0.008)
<i>P-value from F-test of Equivalence</i>	<i>0.579</i>	<i>0.982</i>	<i>0.398</i>
Media-Market-Month-Year Observations	25,736	25,736	25,736
Media Market Fixed Effects	X	X	X
Month-Year Fixed Effects	X	X	X

Notes: + $p < .10$, * $p < 0.05$. Models include no control variables. Robust standard errors clustered at the media market level are in parentheses. Individual strikes occur in a single district, whereas coordinated strikes occur in multiple districts within a given state. Positive ads are promotional towards a candidate, whereas negative ads are those that attack a candidate.

Table C2.

The Effect of Individual v. Coordinated Strikes on Education Finance

	Total Current Expenditures per Pupil	Total Revenues per Pupil	Local Revenues per Pupil	State Revenues per Pupil	Federal Revenues per Pupil
Effect of Individual Strikes	492.257*** (141.4)	510.629*** (147.9)	-179.632* (73.7)	631.963*** (96.8)	57.850** (20.8)
Effect of Coordinated Strikes	552.819* (234.7)	689.025** (260.6)	-141.447 (128.6)	791.470*** (193.6)	32.492 (32.1)
<i>P-value from F-test of Equivalence</i>	<i>0.814</i>	<i>0.531</i>	<i>0.785</i>	<i>0.447</i>	<i>0.479</i>
District-Year Observations	167,876	167,876	166,425	167,021	166,044
District Fixed Effects	X	X	X	X	X
School Year Fixed Effects	X	X	X	X	X

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. We include controls for student enrollment. Robust standard errors clustered at the district level are in parentheses. Individual strikes occur in a single district, whereas coordinated strikes occur in multiple districts within a given state.